Second Rufford Small Grant: **26613-2**

Fourth Progress Report

(Making and Use of the Efficient Cookstove by Households)

Project Title:

Introduction of Efficient Biomass Cook Stove as a Strategy to Reducing Household Pressure on Natural Forests of Guinea Savanna Zone of Nigeria

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PREAMBLE

This is the fourth progress report for the Second Rufford Grant on the project with the aim of introducing efficient and simple biomass cookstove to rural communities in Guinea Savanna Zone of Nigeria. The project purpose is to reduce indoor air pollution, burden of firewood collections by local households, reduce pressures on natural forests, and ultimately mitigate impacts of climate change.

The third stage of the project was on public demonstration for the making of the efficient cookstove in the selected three villages under the project. During the public demonstrations, the people were enthusiastic in learning how to make the efficient cookstove and fully participated. All categories of the village people, including the women, youth and men, participated in the demonstration. This next stage of the project was on the making and using of the efficient cookstove at the household level.

Follow-up to the Demonstration: the third stage of the project ended with follow-up of the communities replicating the cokstoves they were taught how to produce in their respective homes. The project team returned to inspect all the cookstoves made. Each of the community was given a mould to use on making their bricks. The mould was kept with the village head for the use of the entire community. The villagers were to follow the steps taught in making the bricks and then the steps shown in the poster on how to arrange the bricks to produce the efficient cookstove.

Inspections of the efficient cookstoves made by households: the villages were visited on the day fixed for the inspection of efficient cookstoves produced households. It was impressive when the project team went back to the villages and observed that most of the villagers had made the cookstove.from the feedback, the stoves were made by youths and children with the assistance of women.

MAKING OF BRICKS AND EFFICIENT COOKSTOVES BY COMMUNITIES

The feedbacks gotten from the households were impressive on how they produced the bricks and the cookstoves. Details for the processes are given below:

- ***Making of Bricks by the community***: For the production of the bricks, the three communities adopted the same strategy which was instructed to follow during the demonstration. Each of the community asked their children to jointly look for clay and sand, and fetched water. They brought together hoes, shovels and buckets required for production of the bricks. They fixed a day for the production of the bricks. As informed, children and youth actively participated in making of the bricks. The bricks needed by the community were produced together at a location jointly decided by the community.

- ***Production of the efficient cookstoves by the communities***: When the bricks were dry enough, the community shared the bricks for interested households. Children and youths in the communities again took the centre stage in production of the cookstoves. The poster given to the communities were followed in arranging the bricks. The stages indicated in the poster were clear enough to easily produce the efficient cookstoves. Interestingly, some women produced their cookstoves themselves, while some through assistance of their children.

- ***Correction of some cookstoves:*** some cookstoves which were not appropriately produced in some households were dismantled and the bricks reassembled by the project team to make the cookstoves.

HOUSEHOLDS' SURVEY

Survey of thirty (30) households was carried out in the three villages, namely Akewusola, Budo Aare and Oha Meje to investigate level of adoption of the introduced efficient cookstove. The households were randomly selected and women that carry out cooking in households were purposively selected. Consent to participate in the survey were sought from the women. A semi-structured questionnaire was designed and administered to the selected households for a period of two months. Interview and direct observation were used to supplement information collected through the questionnaire.

The survey involves monitoring of the usage, and advantages of the newly introduced cookstove over the traditional three-stone cookstove, and the challenges encountered in use of the efficient cookstove. The information obtained is valuable in determining the level of adoption and modification required in improving the efficient cookstove.

OUTCOMES OF THE HOUSEHOLD SURVEY

Demographic information of the respondents

Women were targeted for the household survey because they carry out cooking in the three communities under the project. As presented in Table 1, almost half (45.2%) of the selected women were above 50 years, close;ly followed by those between 41 and 50 years (32.25%). This means that majority of the sampled women were above 40 years. More than half of all the sampled women (51.61%) had no formal education, 77.42% were married and majority was indigene (87.10%) to the communities.

Table 1: Demographic information of the sampled respondents at Akewusola, Budo Aare and Oha Meje in Kwara State, Nigeria

Questions	Variables	Frequency	Percentage
Age of Respondent	Below 18 years	1	3.23
	18 – 25 years	1	3.23
	25 – 30 years	4	12.90
	30 – 40 years	1	3.23
	41 – 50 years	10	32.26
	Above 50 years	14	45.16
Literacy level	No formal education	16	51.61
	Quranic Education	7	22.58
	Primary	4	12.90
	Secondary	4	12.90
Marital status	Single	3	9.68
	Married	24	77.42
	Divorce	1	3.23
	Widow	2	6.45
	No response	1	3.23
Indigenous Status	1	27	87.10
	2	4	11.91

Production of the efficient cookstove

From Table 2, it could be observed that the community youth carried out majority of the activities from collection of soils (62.86%) to fetching of water used to make the bricks (61.77%), moulding of bricks used in making of the cookstove (75.01%) and making of the efficient and improved *Sahara Cookstove* (70.96%). Only 3.23% of the women made the cookstove themselves, while majority (64.52%) did not participate. Although 16.13% of the women partook in fetching of water while 12.90% partook in gathering of soils.

More than half of the women (54.84) affirmed that the posters given to their households were used as a guide in producing the cookstoves. Hence, 87.10% indicated that making of the efficient cooktove is not difficult. All the women (100%) affirmed that the use of poster made production of the efficient very easy.

Table 2: Production of the efficient cookstove by households in the sampled at Akewusola, Budo Aare and Oha Meje in Kwara State, Nigeria

Questions	Variables	Frequency	Percentage
Who collected the soils (clay, sandy and loamy) used to make your *Sahara Cookstove*?	Self	3	8.57
	Community youth	22	62.86
	Husband	1	2.86
	Children	9	25.71
Who fetched the water used to make the bricks?	Self	3	8.82
	Community youth	21	61.77
	Husband	1	2.94
	Children	9	26.47
Who moulded the bricks used in making your cookstove?	Self	3	9.38
	Community youth	24	75.01
	Husband	1	3.13
	Children	4	12.50
Who made your improved *Sahara Cookstove*?	Self	3	9.68
	Community youth	22	70.96
	Husband	1	3.23
	Children	5	16.13
How did you personally participate in making of your cookstove?	I made the cookstove entirely myself	1	3.23
	I assisted in gathering soil	4	12.90
	I assisted in fetching water	5	16.13
	I assisted in making blocks	1	3.23
	I did not participate in the making	20	64.52
Is the making of *the efficient cookstove* difficult to do?	Difficult	1	3.23
	Not difficult	27	87.10
	Do not know	1	3.23
	No response	2	6.45
Was the poster followed when making your *Sahara Cookstove*?	Yes	17	54.84
	No	14	45.16
If yes, was the poster easy to understand?	Very easy	31	100.00
	Not easy	0	0.00
	Not understandable at all	0	0.00

Cooking with efficient cookstove by the households

Information presented in Table 3 show that 90.32% of the households did the standard 2-pot efficient cookstove. More than half of the households cook three times a day (58.06%), with their efficient cookstove three times a day, while 38.71% cooked twice a day. On the average, 87.10% of the sampled households spent one hour on each cooking, translating to three hours of cooking per day. From the foregoing results, it could be deduced that the households are using their newly introduced efficient cookstove three hours for cooking three different meals per day.

Table 3: Production of the efficient cookstove by sampled households in the sampled respondents at Akewusola, Budo Aare and Oha Meje in Kwara State, Nigeria

Questions	Variables	Frequency	Percentage
What is/are the sizes of your efficient c*ookstove* size	One-pot cookstove	2	6.45
	Standard 2-pot cookstove	28	90.32
	Three-pot cookstove	1	3.23
	Four pot stand	0	0.00
On average, how many meals do you cook each day?	One	0	0.00
	Two	11	35.48
	Three	18	58.06
	More than Three	2	6.45
How often do you use the efficient cookstove?	Once a day	1	3.23
	Twice a day	12	38.71
	Thrice a day	17	54.84
	Others	1	3.23
On average, how many hours do you spend cooking a complete meal?	1	27	87.10
	2	3	9.68
	7	1	3.23

Efficiency of the newly introduced efficient cookstove

As shown in Figure 1, all the households (100%) affirmed that the newly introduced efficient cookstove has reduced smoke emission, firewood usage, and frequency of firewood collection crom the wild. Also, 96.77% affirmed that the time they spent in cooling has reduced through the use of the efficient cookstove.

- ***Save firewood***: all the visited households confirmed that the quantity of the firewood they used in cooking has drastically reduced with the adoption of the efficient cookstoves. Few sticks of firewood is now use in cooking unlike the big firewood previously used. This is a direct reduction in firewood exploitation from the wild and natural forest. Also, reduction in the burden of firewood collection by the people, especially the women and children.

- ***Efficient Cookstove cooks faster than the three-stove traditional cookstove:*** the households confirmed that the efficient cookstove cooks faster than the three-stone traditional cookstove which they inherited and have been using since birth. The observation made was that the efficient cookstove conserves heat, hence makes it cook faster. The efficient cookstove is still hot even after the fire has been put out. The hot charcoal produced in the cookstove after the fire has been put out makes it to still hot for a longer period of time.

- ***Efficient cookstove does not smoke:*** the villagers confirmed that the newly introduced efficient cookstove does not smoke like the traditional three-stone cookstove when in usage. The traditional cookstove produces lots of smoke which constitute high quantity of in-door air pollution. This is not good for the health of the local people. With the introduction of the efficient cookstove, the community people were glad about the solution to the issue of smoke which is not good for their health.

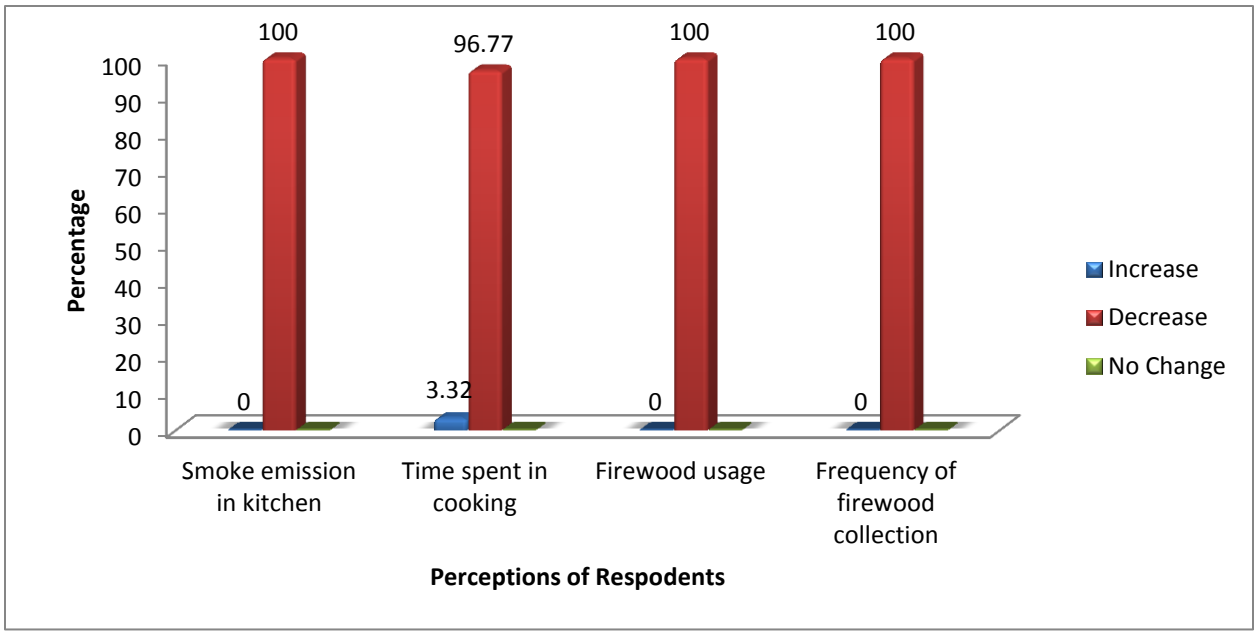

Figure 1: Perception of the households on efficiency of the efficient cookstove

Design and usage of the efficient cookstove

The respondents were asked to comment on the design of the efficient cookstove. About 83.87% indicated that the cookstove is very well designed to meet their cooking. Only 3.23% used the cookstove for commercial purpose, while the rest (96.77%) used their cooktove for domestic cooking. As a follow-up question, only 19.35% of the household indicated that the efficient coostove is not appropriate for all their cooking. The major reason for inappropriate of

the efficient cookstove, as indicated by some of the respondents, is that it is not big enough to accommodate large and commercial cooking.

Table 4: Design of the efficient cookstove and use of traditional cookstove

Questions	Variables	Frequency	Percentage
How is the efficient c*ookstove* designed to meet your cooking?	Very well designed	26	83.87
	It's not well designed	2	6.45
	No response	3	9.68
Type of cooking the efficient cookstove is used for	Commercial cooking	1	3.23
	Domestics cooking	30	96.77
Is the *efficient cookstove* appropriate for all your cooking?	Yes	25	80.65
	No	6	19.35

Use of Traditional three-stone cookstove

Despite introduction of the efficient cookstove, 25.81% of the households still indicated that they use traditional three-stone cooktove (Figure 2). The households that are still using traditional cookstove is because they engage cooking large family meals and for commercial cooking such as festival cooking, local restaurant cooking, shea butter production, local processing of soya beans into milk and cheese, among others.

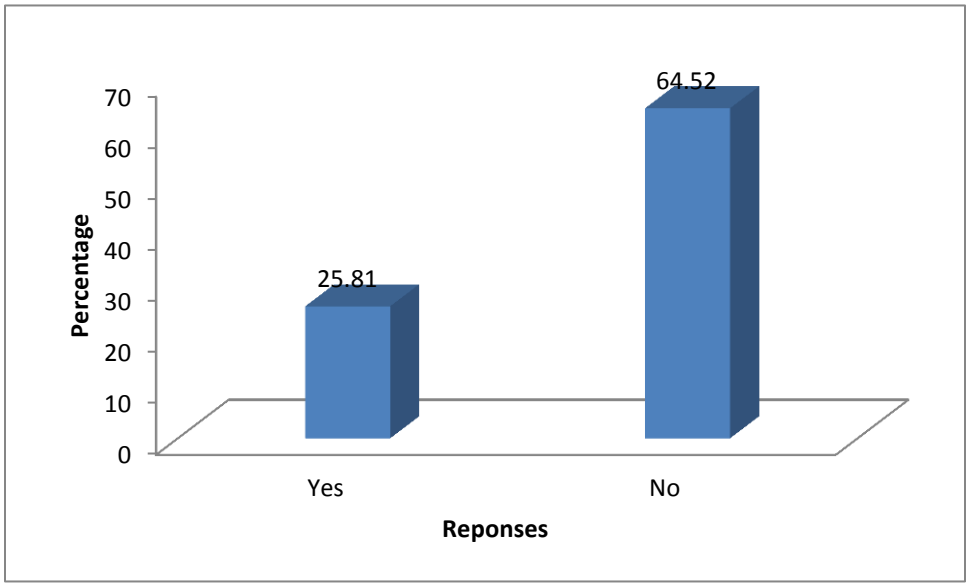

Figure 2: Use of Traditional three-stone cookstove by the households

Awareness creation on the efficient cookstove

Awareness creation about the improved and efficient biomass cookctove is very important to introduction and adoption in other within and outside of the communities. When asked if the women have talked to someone on the newly introduced cookstove, 77.42% indicated that they had done so. Those that the women had informed about the cookstoves were mainly their family members (50.0%), and friends (21.88%) that were located within (37.5%) and outside (40.63%) the communities.

Awareness creation on the efficient cookstove by the Villagers

Questions	**Variables** (n = 31)	**Frequency**	**Percentage**
Have you talked to someone about the efficient c*ookstove*?	Yes	24	77.42
	No	7	22.58
What is your relationship with the persons you talked to?	Family member	16	50.00
	Friend	7	21.88
	Others	0	0.00
	No response	9	28.13
What is the location of the persons that you talked to about the efficient cookstove?	Within my community	12	37.50
	Outside my community	13	40.63
	No response	7	21.88

Improvement in the efficient cookstove

During the survey, the women were asked to suggest what they think should be done to further improved the design and efficiency of the introduced efficient cookstove for longer usage and to effectively meet their cooking. The following are their suggestions:

- The efficient cookstove should be made bigger so as to accommodate commercial scale cooking and production.
- Addition of cement during brick making and cookstove production so as to make the cookstove stronger and withstand rainfall, etc
- Design that incorporation wire mesh thereby accommodate use of charcoal and use in smoking fish, etc
- Cow dung could be added when mixing the clay and sand for production of the efficient cookstove, and also used to plaster outside of the efficient cookstove thereby preventing cracking
- Making of shed over the efficient cookstove made outside in the open.to prevent direct rainfall that can cause its damage.
- Constant plastering of the outside of the cookstove with clay.

CONCLUSION

Introduction of the efficient cookstove has really added innovation to domestic cooking, wellbeing of the local communities under this project. It is believed that the project will lead to protection of natural forests in the local environment. Already, there are evidences of reduction in quantity of firewood used by the households. This will definitely translates to reduction in firewood collection from the natural forest. Also, there are reductions in smoke emissions from the newly introduced efficient cookstove, thereby reducing indoor air pollution beneficial to health of the women, children and households.

APPRECIATION

A sincere appreciation to The Foundation to Rufford for the financial support used in carrying out this project. Also, the project team sincerely appreciates the Village Heads and entire communities of Oha Meje, Budo Aare and Akewusola for their cooperation and support during the different stages of this project.

We are planning to embark on massive expansion of the introduction of the efficient cookstoves to other communities in the savannah zone of Nigeria. We shall address all the identified suggestions toward improving efficiency of the efficient cookstove.

Making of Efficient Cookstoves by the communities

Sharing of blocks jointly produced by the community

Sharing of the blocks jointly produced by the community

Some of the shared blocks assembled in a household

Teaching the children and youths on how to make the cookstove by using the poster as guide

Demonstration to youth and children on how to make the cookstove in a local kitchen

Demostration to group of households on production of cookstove

Teaching some youth and men in an household on making of efficient cookstoves

Head of a family taking a photograph with single-phase cookstove made for his household

A woman taking photograph with the cookstove she personally made

A woman personally made her two-phase cookstove

These boys made the two-phase cookstove for their household

Children in the community assisted their parents in producing the cookstoves. This is a capacity building for the youths and sustainability of the project

Ladies learning how to make the cookstove for their household

Use and maintenance of the Efficient Cookstove

Two-phase Improved and Efficient Biomass Cookstove in use by households

A woman cooking with her efficient cookstove

Training on how to maintain the cookstove by plastering cracks wall with clay

Elderly woman with her three-phase efficient cookstove made by her children

A woman with her cookstove use for home and commercial cookings

Cookstove use for smoking fish

Household made shed to protect direct rainfall and provide shade while cooking

Environmental Education in a Secondary School

Interaction with students during the preliminary aspect of Environmental Education

Interaction with students during the preliminary aspect of Environmental Education

Photo session with the students

Interaction with some of the teachers for the preliminary aspect of the Environmental Education